

Servitization: A contemporary thematic review of four major research streams

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ABSTRACT

Servitization describes the addition of services to manufacturers' core product offerings to create additional customer value. This study aims to identify the key themes and research priorities in this body of literature over thirteen years from 2005 and 2017, based on four major research streams (general management, marketing, operations, and service management). Prior multi-theme literature reviews have focused on operations journals, overlooking important work in other streams, particularly marketing. Informed by a systematic literature review of 219 papers, the study identifies five main themes: service offerings; strategy and structure; motivations and performance; resources and capabilities; service development, sales, and delivery. Within each theme, gaps in the literature are identified and eleven research priorities presented. The review shows that the literature has evolved significantly in recent years, becoming increasingly diverse. A recent noteworthy topic is the use of digital technologies, which indicates the increasing relevance of technological developments to manufacturers' service activities. Our review highlights that there are still some fundamental aspects of servitization that warrant further research, primarily the need to replace the focal-manufacturer perspective with a multi-actor perspective that highlights the important role of relationships with existing and potentially new actors as a result of technological developments.

1. Introduction

The importance of services to business-to-business manufacturers has long been recognized in Management and Organization Studies (MOS). The addition of services to core product offerings to create additional customer value is often described as 'servitization'¹ (Vandermerwe & Rada, 1988) or, later, 'transition from products to services' (Oliva & Kallenberg, 2003) and 'service infusion' (Brax, 2005). Kowalkowski, Gebauer, Kamp, and Parry (2017) elucidated differences in the meaning of these terms. Servitization is the transformation of a firm from taking a product- to taking a service-centric approach. It represents a significant change in the business model and mission of the firm, whereby the service business serves as a growth engine of the firm. Service infusion, on the other hand, is when the relative importance of service offerings to a firm increases compared to product offerings. This is an important change for the firm, but does not

necessarily reflect a change in its business model and mission; typically, the fundamental role of the service offerings is to protect its traditional products.

A practical example of servitization is truck manufacturer Toyota Materials Handling Europe, which has considerably enhanced the role of services in its business. One for service infusion is construction equipment manufacturer JCB, who use services to support customers and dealers in the operation of their equipment. Despite differences in the definitions of servitization and service infusion, in practice, it is often difficult to distinguish which approach manufacturers are following, and this ambiguity means that the terms are often used interchangeably (e.g., Eloranta & Turunen, 2015), as is the case in this paper.

The aim of this literature review is to synthesize contemporary research on servitization to consolidate existing knowledge and identify future research priorities. The increase in publications in recent years

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¹ Sometimes spelled 'servitisation' (Dachs et al., 2014) or referred to as 'servicizing' or 'servicification,' although servicizing is sometimes specifically applied in the context of sustainability to denote "green" business models (e.g., Agrawal & Bellos, 2017).

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points to the need for a more contemporary review. This study addresses two main gaps in previous literature reviews. First, most do not attempt to simultaneously address studies within the four major research streams (general management, marketing, operations, and service management) and consequently do not fully consider studies addressing similar concepts in parallel MOS research streams. The three multi-theme reviews (Baines et al., 2017; Baines, Lightfoot, Benedettini, & Kay, 2009; Lightfoot, Baines, & Smart, 2013) are published in operations journals and do not comprehensively reflect papers from other streams. For example, in Baines et al. (2017) only 15% of the 232 papers reviewed are from marketing journals, 4% from service management journals. For Lightfoot et al. (2013), 17% of 95 papers are from marketing journals, 8% service management journals. Given a large number of papers on this topic in marketing and service management journals, this appears a significant issue, potentially leading to important research being overlooked. Second, the remaining literature reviews focus on specific issues and do not attempt to identify the full array of themes present in the literature; for example, Adrodegari and Sacconi (2017) – business models; Zhang and Banerji (2017) – challenges; and as such are not directly comparable to this study. Thus, it is argued that previous reviews are not inclusive to all MOS research streams and do not provide a clear exhaustive thematic account of servitization, which is necessary to identify the most pressing issues requiring research attention.

Accordingly, a systematic literature review was conducted (Barczak, 2017; Tranfield, Denyer, & Smart, 2003). It leverages the inputs of diverse MOS research streams to draw an overview of the most important themes and uncover the knowledge gaps that constitute critical research priorities to be addressed in order to move forward theory and practice in the field. As such, this review has the following objectives:

- to provide a holistic account of the literature on servitization based on current knowledge about a set of key research themes;
- to uncover knowledge gaps and research-related issues facing this field around these key research themes;
- to identify research priorities; that is, critical aspects whose investigation can deliver more valuable theoretical and applied knowledge in the years ahead, around these gaps and issues.

By simultaneously drawing on all MOS research streams and topic areas, a comprehensive synthesis of existing research is provided. Also, while assessing the current state of the field, it frames knowledge gaps based on their potential to strengthen and advance this research field. As a result of this study, five key themes were identified in the extant literature on servitization: ‘service offerings’, ‘strategy and structure’, ‘motivations and performance’, ‘resources and capabilities’ and ‘service development, sales, and delivery’, with research priorities identified for each theme. The inclusion of four major research streams in this study has enabled us to highlight the importance of taking a multi-actor, relational perspective. This has helped to demonstrate the importance of understanding different perspectives on relationships between different types of actors, and networks of actors, across these themes.

2. Methodology

A three-stage approach was adopted to conduct the systematic review (Tranfield et al., 2003). Stage 1 is planning the review, with the study conceived by a team with wide knowledge about servitization who were able to identify the gaps in prior work and articulate study objectives. Stage 2 (conducting the review) is set out in this section, while phase 3 (reporting and dissemination) is presented in section 3, which summarizes existing literature for each theme, and identifies gaps in knowledge and develops future research priorities. Section 4 is the conclusion to the paper, which sets out the study's contributions, managerial implications, and limitations.

2.1. Conducting the review

Relevant literature was identified through undertaking a keyword search, based on the research team's knowledge of the topic (Tranfield et al., 2003). The following terms were used: ‘after-sales services’, ‘industrial services’, ‘product-related services’, ‘product-service system’, ‘servitization’, ‘servitisation’, ‘servicification’, ‘service infusion’, ‘solutions’ and ‘transition from product to services.’ To conduct the search, the Scopus database was used, using title, abstract and keyword fields, searching the ‘Business, Management & Accounting’ subject area. Tranfield et al. (2003) note the importance of only including work that meets all the inclusion criteria and which manifests none of the exclusion criteria. For this study, four criteria were applied. First, research fully published between January 2005 and December 2017 (inclusive) was selected to ensure that the review was both contemporary and comprehensive since it is within this period that most papers have been published (Baines et al., 2017). Second, papers were selected in journals which were in the Academic Journal Guide (AJG),² thereby excluding journals from other disciplines and books/conference papers. Third, papers were published in journals ranked at least 2* by the AJG to ensure that only work that met a high-quality threshold was included (according to the AJG, journals ranked 2* and above publish original research). Fourth, papers were selected that focused on manufacturers' services and solutions, as the term ‘solution’, in particular, is sometimes used in other contexts.

272 papers provisionally met these search criteria and were retrieved, and two members of the research team then read the abstracts of these papers. As Tranfield et al. (2003) find, decisions regarding inclusion and exclusion remain relatively subjective and when an abstract was ambiguous (in terms of what the paper was about), the full paper was read by the research team members and a decision made about whether it should be included. This was particularly the case for the fourth criterion; that is, whether papers about ‘solutions’ were concerning this topic or some other aspect of manufacturing. At this point, 65 papers were removed due to little focus on the core topic. The authors reviewed the list of papers from this search to ensure its completeness, and through a snowballing approach (Greenhalgh & Peacock, 2005), considered other papers in the original sample's references and subsequent papers that referenced the original sample's papers. Using Google Scholar, 12 additional papers were added to the final list at this point; eight through backward and four through forward snowballing.

In total, 219 papers met all the criteria for inclusion in the review. The Appendix A provides a list of the research streams, journals within each stream, number of papers published in each journal and the total number of citations for these papers by journal (Google Scholar). During the period of our review, papers were distributed among the four research streams (percentage of total papers in each stream): marketing (45%); operations (25%); service management (16%); general management (14%). Only three journals had 20+ papers on this topic during the review period: two marketing journals, *Industrial Marketing Management* (IMM) (56), *Journal of Business & Industrial Marketing* (23) and one service management journal, *Journal of Service Management* (20). Equally, the papers published in marketing journals received over half of all citations, with papers published in IMM having nearly a third of all citations. This supports the contention that papers in marketing and service management journals need to be fully included in literature reviews of this topic.

2.2. Review and writing process

A thematic approach was adopted to reading and categorizing the papers, identifying themes which conveyed important data about the research topic under investigation (Braun & Clarke, 2006). Three

² United Kingdom's Chartered Association of Business Schools (2015)

authors in the research team started the review process by individually reading each paper and categorizing it within one or two themes. Collectively, the authors then agreed which was the dominant theme of each paper. The coding process was iterative, involving discussions among the research team, with the aim of allowing the interpretation of the literature to be adapted and refined through the course of the study (Tranfield et al., 2003). For example, motivations for manufacturers offering services was originally identified as a separate theme but given the limited number of papers for which this was the primary theme, it was ultimately more synergistic to combine it with another on the performance of services.

Five themes arose from our analysis. First, service offerings that manufacturers make to their customers, including the taxonomies used to distinguish between services. Some research suggests manufacturers offer base (e.g., installation), intermediate (e.g., maintenance) and advanced (e.g., availability) services to customers (Baines & Lightfoot, 2013). Second, the service strategies that manufacturers adopt and the implications for decisions about organizational design (structure). For example, a manufacturer whose strategy is to offer advanced services, in addition to base/intermediate services, may set up a service division, separate from its product divisions (Oliva, Gebauer, & Brann, 2012). Third, the motivations for and performance of services and their impact on the firm. Manufacturers may be motivated to extend the role of services in order to take advantage of new, more stable, revenue streams (Malleret, 2006). Fourth, the resources and capabilities manufacturers need to enhance the role of services in their businesses, including those which are internal and those which link manufacturers with other actors such as customers and suppliers. A manufacturer developing an availability offering will need to consider the capabilities of its customers; for example, to carry out preventative maintenance, to help decide whether it is feasible to deliver the offering (Forkmann, Henneberg, Witell, & Kindström (2017)). Fifth, service development, sales, and delivery activities that manufacturers need to undertake. For example, the development, sale, and delivery of product availability would need to be different from equivalent processes for products and base/intermediate services (Grenmyr, Witell, Löfberg, Edvardsson, & Fundin, 2014).

These five themes are presented in Fig. 1, which shows how service offerings are the key interface between the manufacturer and customers/intermediaries (such as distributors). The model also shows that ‘resources/capabilities’ and ‘service development, sales, and delivery’ are potentially developed in conjunction with suppliers (illustrated by using a double-headed arrow). Our analysis of the papers demonstrates the importance of other actors outside the focal manufacturer, particularly customers and intermediaries. Of the 219 papers, 44 explicitly focus on relationships with other actors; 22 with customers and intermediaries (17 in marketing journals); 14 with suppliers (12 in operations journals), while the remaining eight take a network perspective

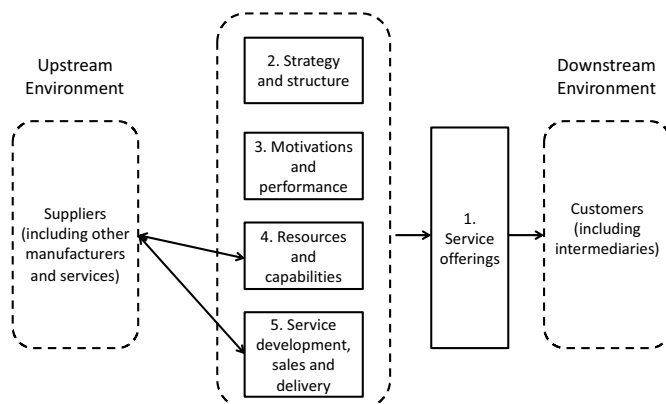


Fig. 1. Actors involved in servitization.

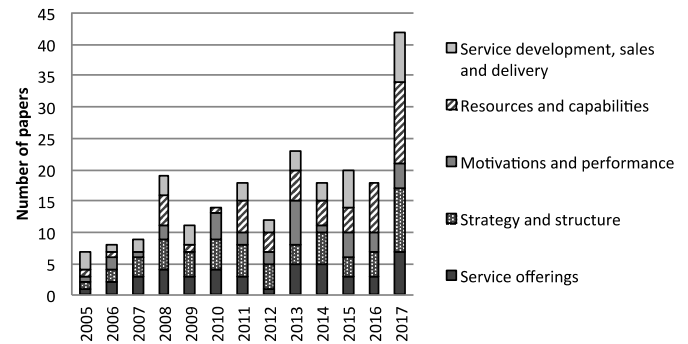


Fig. 2. Coverage by theme during the review period.

(including relationships with both suppliers and customers).

While these themes are characterized as distinct, there are some overlaps. For example, the service offerings a manufacturer makes to the market will be partially dependent on the strategy it is adopting and its resources and capabilities; manufacturers' service processes will be dependent on their resources and capabilities. Despite some inevitable minor overlaps, these five themes are distinct, each making separate contributions to knowledge on the topic and therefore requiring its own review and analysis.

2.3. Descriptive analysis of the field

In line with Tranfield et al. (2003), a descriptive analysis of the field is presented. Fig. 2 shows how the coverage of the five themes has evolved over the review period, while Fig. 3 shows the thematic coverage within the four research streams.

The number of papers published per year has increased during the review period: 24 between 2005 and 2007; 44 between 2008 and 2010; 52 between 2011 and 2013; 57 between 2014 and 2016 and 42 in 2017. This shows that there was an initial acceleration in the number of papers, followed by more steady increases. In 2017, the largest increase in the number of papers published was evident, with more than twice as many publications than in any of the three preceding years. This sharp increase is, to some extent, explained by the publication of a Special Issue of Industrial Marketing Management (Vol. 60, January 2017) that includes 10 of the 42 papers. Compared to the previous years, 2017 features a particularly noteworthy increase in the number of papers on ‘strategy and structure’ and on ‘resources/capabilities’, whereas the number of papers on ‘motivations and performance’ and on ‘service offerings’ is stable. It seems reasonable to expect that the evaluation of motivations, performance and service offerings would precede the

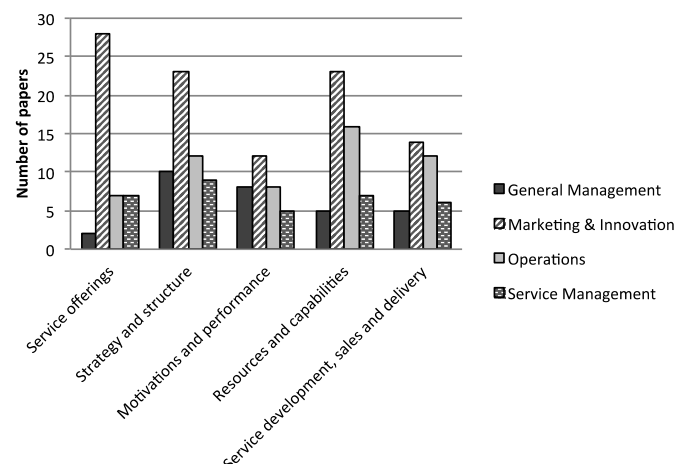


Fig. 3. Coverage by theme in each research stream.

Table 1
Most cited papers by theme during the review period.

Theme	Authors (date)	Journal	No. citations ^a
Service offerings	Tuli et al. (2007)	Journal of Marketing	1134
	Brady, Davies, and Gann (2005)	International Journal of Project Management	475
	Araujo and Spring (2006)	Industrial Marketing Management	310
Strategy and structure	Davies, Brady, and Hobday (2006)	MIT Sloan Management Review	616
	Davies et al. (2007)	Industrial Marketing Management	524
	Matthyssens and Vandenbempt (2008)	Industrial Marketing Management	397
Motivations and performance	Gebauer et al. (2005)	European Management Journal	713
	Cohen et al. (2006)	Harvard Business Review	615
	Fang et al. (2008)	Journal of Marketing	542
Resources and capabilities	Ulag and Reinartz (2011)	Journal of Marketing	565
	Cova and Salle (2008)	Industrial Marketing Management	458
	Neu and Brown (2005)	Journal of Service Research	433
Service development, sales and delivery	Baines, Lightfoot, Peppard, et al. (2009)	International Journal of Operations & Production Management	365
	Reinartz and Ulag (2008)	Harvard Business Review	288
	Kindström et al. (2013)	Journal of Business Research	281

^a Citations from Google Scholar (June 2018).

evaluation of service strategy and resources/capabilities. Hence, the increase in papers published in 2017 might be indicative of firms being in more advanced stages of service business implementation. During 2017 there was also a significant increase in the number of papers on 'service development, sales, and delivery', which is due to the emergence of new topics dealing with digitalization and technological developments. In 2018 a further 45 papers were published, showing that momentum in servitization research is continuing.

Table 1 shows the three most cited papers for each theme during the review period, while Fig. 4 identifies papers with over 50 citations in each of the four research streams, when they were published and whether they are conceptual or empirical (qualitative/quantitative). Citation analysis can help to identify the most important work in a field, although it should be recognized that it is biased towards older publications (Zupic & Čater, 2015). Through this analysis, nearly half of the most cited papers (by theme) are in marketing journals (7/15), and marketing journals have most papers with over 50 citations.

Fig. 5 categorizes the 219 papers based on the method used, either

conceptual or empirical studies (using qualitative or quantitative methods), and shows how many of each type were published each year during the review period.

This analysis shows that servitization has predominantly been studied through empirical techniques (198/219 papers) rather than conceptual papers (21/219). The majority of empirical papers are based on qualitative data (158), while fewer papers use quantitative data (40). Although using qualitative data is still the most common method, the number of quantitative papers is increasing, with the majority (19) published in the last four years.

3. Themes in the literature

The third phase of the study was reporting and dissemination (Tranfield et al., 2003). Each section of the review is predominantly based on the papers that met the selection criteria. However, reference is made to some earlier papers which fall outside these criteria, and are included to provide context to the theme, as well as literature reviews

General Management

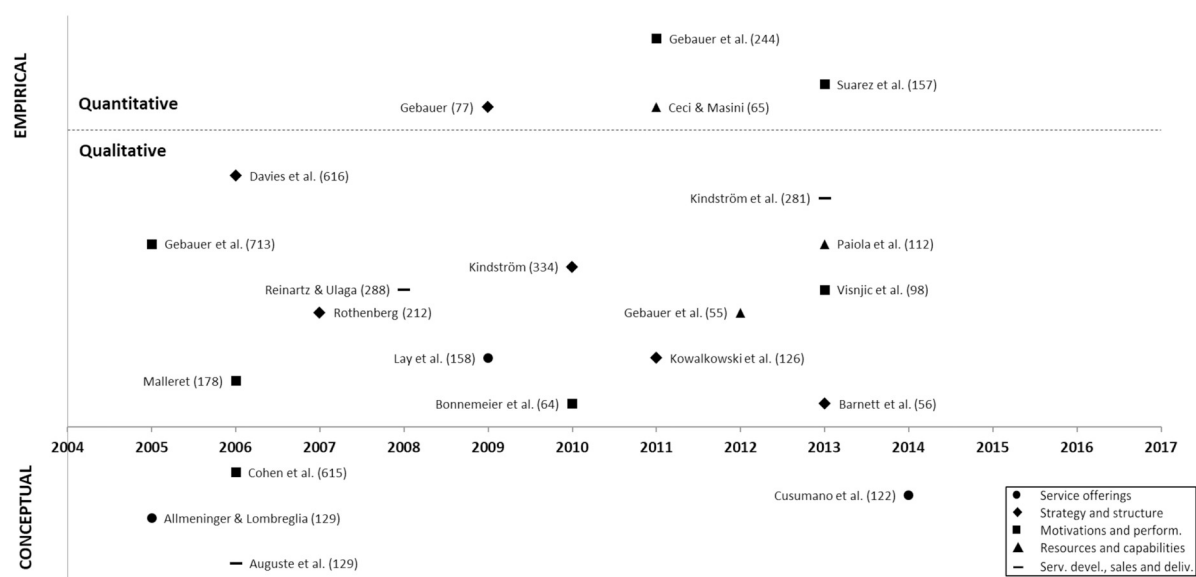


Fig. 4. Most cited papers by research stream and method.

(Based on citations from Google Scholar. Minimum 50 citations. Actual number of citations at June 2018 shown in brackets) (Jacob and Ulag, 2008, Neu and Brown, 2008).

Marketing & Innovation

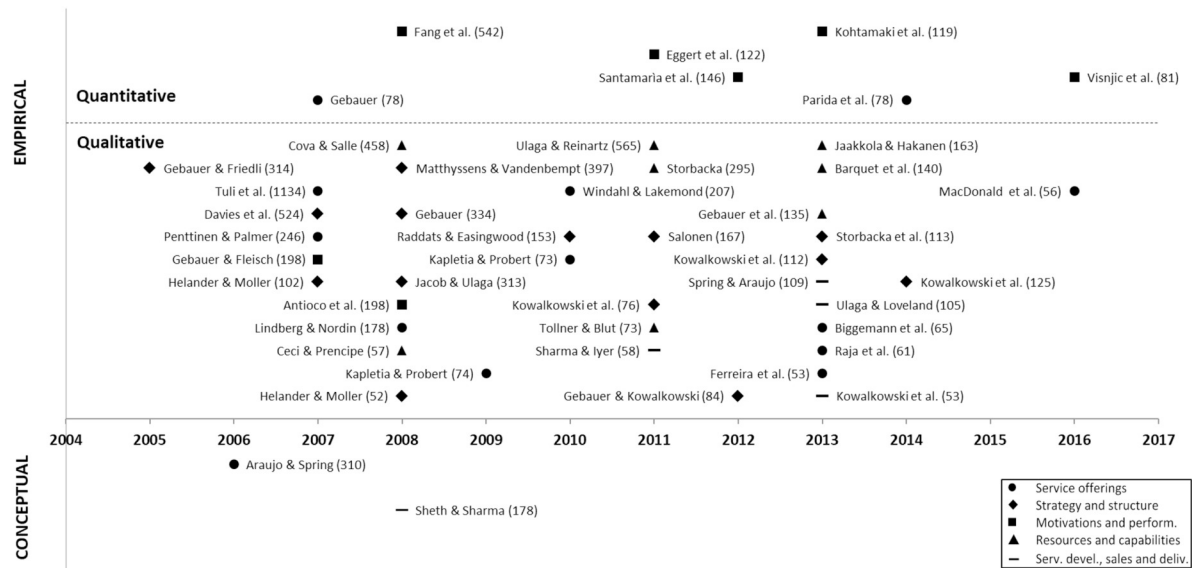


Fig. 4. (continued)

and introductions to special issues, where appropriate. At end of each theme, Tables 3-7 are used to summarize existing literature, identify gaps in knowledge, and suggest the research priorities for future research on servitization based on the judgment of the research team. This last stage of the review process is central since it is important to separate what is already known and established from the challenges that should be addressed to advance the field (Tranfield et al., 2003).

3.1. Service offerings

Detailed definitions and classifications of services have come from marketing and operations management research in particular (e.g., Lovelock, 1983; Rathmell, 1966; Sampson & Froehle, 2006; Zeithaml, Parasuraman, & Berry, 1985). Lightfoot et al. (2013) conducted a systematic review of the literature, either directly or indirectly associated

with servitization. They note that the earlier discussion about product/service differentiation has largely been replaced by one which considers inter-relationships between the two. These inter-relationships are particularly relevant for manufacturers, seen as inherently product-centric organizations. Cusumano, Kahl, and Suarez (2015) focus on lifecycle theory to conceptually argue that different types of services are more prominent under particular industry conditions or under different stages of the industry evolution. They suggest that the insights coming from service industry research do not help to fully explain the special nature of services offered by manufacturers. Consequently, classification schemes and taxonomies specifically concerning manufacturing-related services have been developed (see Table 2).

A common way to characterize services in manufacturing, especially in the marketing and the strategic management literature, is as basic product complements, where services facilitate the sale and usage of

Operations

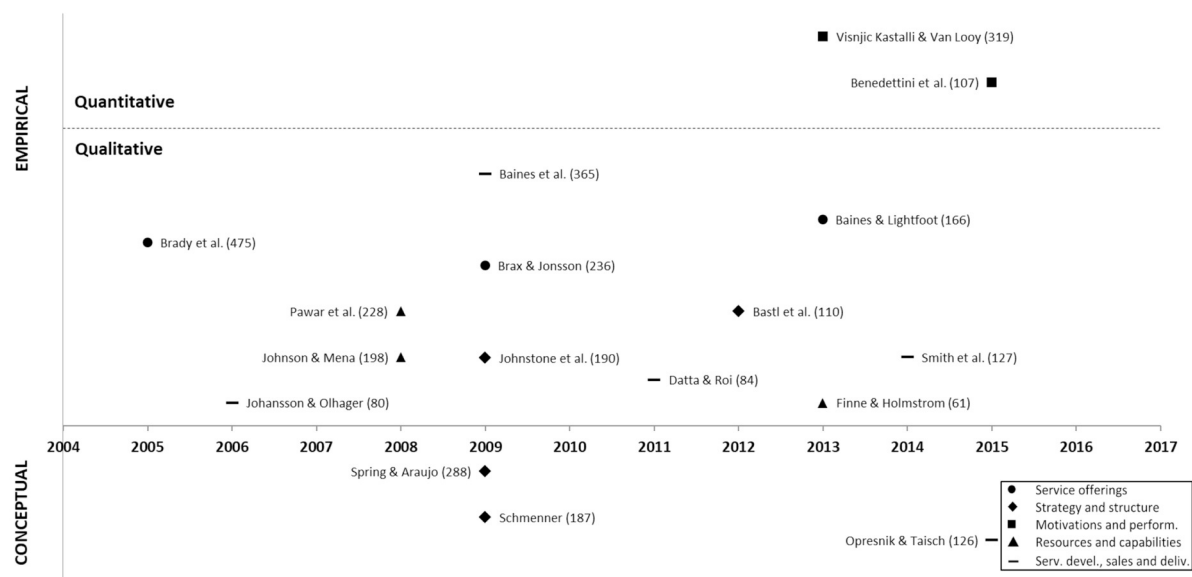


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Service Management

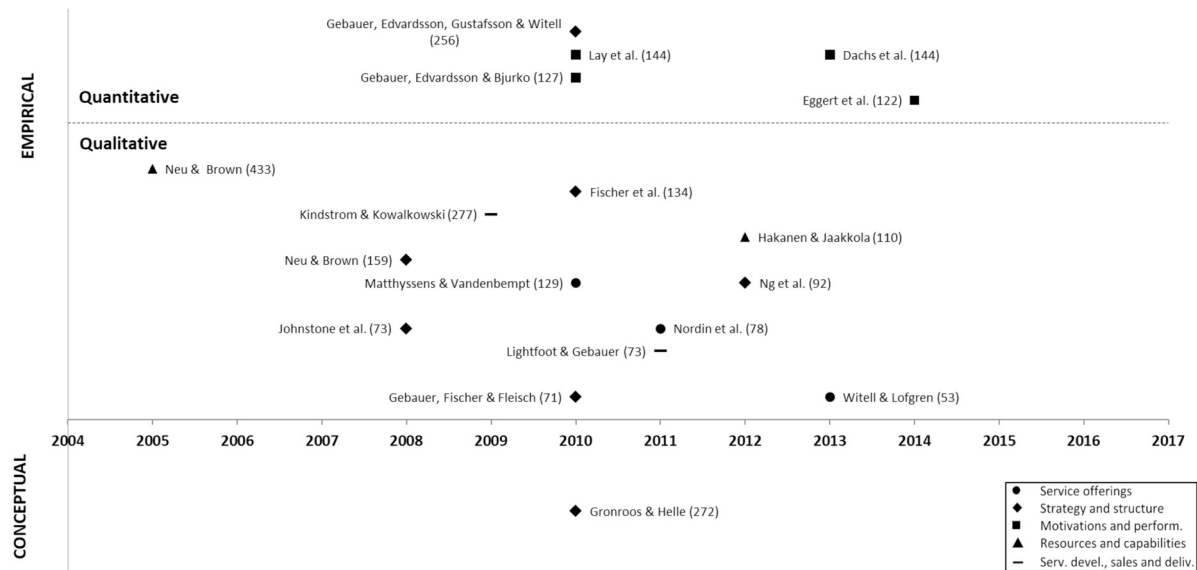


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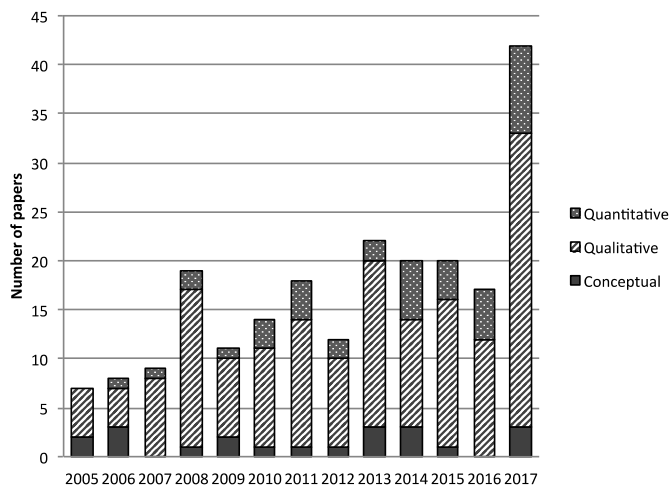


Fig. 5. Methods used in the published papers.

physical goods (e.g., Cusumano et al., 2015). Mathieu (2001) refers to these as services supporting the supplier's product (SSPs) and contrasts them with services supporting the customer's actions (SSCs) that are inherently process-oriented and do not have to be product specific. In an interview study of a micro-electronics manufacturer's network, based on thematic and lexical analyses, she finds support for the proposed classification and discusses how a manufacturer can achieve differentiation through the development of an SSC. For instance, after-sales services, such as product repair and maintenance, are classified as SSPs, whereas R&D services are regarded as SSCs. Within the operations literature, Baines and Lightfoot (2013) set out a different taxonomy: *base* services (e.g., installation, spare part provision); *intermediate* services (e.g., maintenance, technical support); *advanced* services (e.g., risk and reward sharing contracts). Based on case studies of four manufacturers, they explore the practices and technologies that these firms employ when specifically delivering advanced services. Within the marketing literature, Ulaga and Reinartz (2011) propose a taxonomy of industrial services and discuss key success factors across categories. Relying on two pilot studies and interviews with senior managers in 22 firms, they derive a two-dimensional framework. While the first dimension corresponds to Mathieu's (2001) SSP-SSC

classification, the second concerns whether the service is grounded in the promise to perform a deed (i.e., input-based) or achieve performance (i.e., output-based). Base and intermediate services can be classified as input-based and advanced services as output-based.

While the taxonomies identified in Table 2 are conceptualized as distinct dimensions, Raddats and Kowalkowski (2014) note that many of them are interrelated (i.e., the first eight in Table 2). For instance, several studies identify close relationships as either a prerequisite for, or an antecedent to, more customized, integrated, process-orientated, and output-based service offerings. Similarly, increased customization generally implies increased integration and bundling of different services or service and product components. Thus, it can be argued that many of the taxonomies in the literature are related to the SSP vs. SSC dichotomy. Indeed, this is the most common taxonomy used to classify services. Antioco, Moenaert, Lindgreen, and Wetzels (2008) validates its importance when conducting an empirical survey of the effects of organizational parameters and service category on product sales and service volume. Meanwhile, Eggert, Hogreve, Ulaga, and Muenkhoff (2014), using longitudinal data from 513 mechanical engineering firms, find that SSPs display only indirect effects on financial performance mediated through SSCs, whereas SSCs directly affect revenue and profit streams. Furthermore, the SSP vs. SSC dichotomy is frequently combined with another taxonomy to present, inductively or deductively, two-dimensional classification systems (e.g., Ulaga & Reinartz, 2011: input-based vs. output-based service; Windahl & Lakemond, 2010: customer-owned vs. supplier-owned equipment). Despite various taxonomies in the literature, there is little indication of the relative prevalence of each service type. For example, while advanced services appear to garner most research attention, it may be that base and intermediate services are more prevalent. Although definitive findings have not yet been identified, research such as Kowalkowski and Windahl (2015) 13 cases based on more than 170 interviews and Lay, Schroeter, and Biege's (2009) interview study with 17 decision-makers show that less advanced service-based business concepts tend to be more prevalent.

A specific category of offerings that has received increasing attention is the concept of solutions, defined as combinations of products and services that are tailored and integrated to solve customers' specific problems (Davies, Brady, & Hobday, 2007). The origins of the concept can be traced back to the early literature on 'systems selling' (Hannaford, 1976; Mattsson, 1973), although Davies et al. (2007) and

Table 2

Taxonomies used to distinguish between manufacturers' service offerings.

Taxonomy	Description	Indicative source(s)
Services supporting products (SSPs) vs. services supporting the customer's actions (SSCs)	Services are product complements, which facilitate the sale and usage of physical goods (SSPs) or process-orientated offerings, not linked to specific products (SSCs)	Mathieu (2001)
Customer vs. supplier ownership of equipment	The customer either buys the equipment and services or the supplier retains ownership and is responsible for operations and maintenance	Windahl and Lakemond (2010)
Product complements vs. substitutes	Services are not just complements for products but can be substitutes for them	Cusumano et al. (2015)
Transactional vs. relational	Transactional services only require 'arm's length' relationships between seller and buyer, while relational services require mutual trust, commitment, long-term orientation	Penttinen and Palmer (2007)
Standardization vs. customisation	Services are either created in standard packages or customized for client requirements	Matthyssens and Vandenbempt (2010)
Offered individually vs. integrated bundles	Services mainly offered on their own or bundled with a range of other services, ranging from a price bundle to a complex integration of different offerings as part of a solution	Matthyssens and Vandenbempt (2008)
Input- vs. output-based	Input-based services focus on the delivery and performance of a particular deed and the payment model is to 'pay-per-service' unit, while output-based services focus on the achieved outcome	Ulag and Reinartz (2011)
Base, vs. intermediate vs. advanced services	Service outcomes focused on product provision (base), maintenance of the product condition (intermediate) and capability through the performance of the product (advanced)	Baines and Lightfoot (2013)
Free vs. chargeable	Formalized service offerings may be provided 'free' as part of the product sale or charged for separately. Some design/consultation services may also be free	Witell and Löfgren (2013)
Own products vs. multi-vendor	Whether services are offered on mainly own products or also serve the installed base of competing manufacturers	Davies et al. (2006)

Adapted from Raddats and Kowalkowski (2014): 22).

Nordin and Kowalkowski (2010) argue that many recent studies on solutions fail to acknowledge the conceptual heritage. Solutions have traditionally been regarded as bundles of tangible goods, services, and software. Ulag and Reinartz (2011) refer to such product-service bundles as hybrid offerings. Other scholars, such as Tuli, Kohli, and Bharadwaj (2007), have challenged this supplier-centric view. Drawing on in-depth interviews with over 100 managers in both customer and supplier firms, they argue that, from a customer point of view, a solution should be regarded as a set of customer-supplier relational processes over the complete lifecycle of the product. In their editorial to an IMM special issue on service transition, Evanschitzky, Wangenheim, and Woisetschlager (2011) put forward that solutions are interactively designed. Storbacka (2011), who conducted a qualitative study of ten multinationals, identifies twelve categories of solution capabilities and also highlights that solutions should solve strategically important customer-specific problems for which the provider is compensated on the basis of the customer's value-in-use. Friend and Malshe (2016) argue that research is often limited due to lack of data from customers' stakeholders. Based on interviews with 117 managers across 59 key accounts, they identify four key skills (diversity sensitivity, multipoint probing, orchestration, and stability preservation) for developing solutions within networked settings. Hence, rather than being a singular manufacturer-delivered offering, the process of solution provision may take place with the involvement of an interrelated stakeholder ecosystem.

In the engineering management literature, solutions are typically referred to as Product-Service Systems (PSS), and the most common taxonomy of system models (Tukker, 2004) resembles common solution taxonomies in the marketing (Helander & Möller, 2007; Windahl & Lakemond, 2010) and operations (Baines & Lightfoot, 2013) literature. Tukker (2004) conceptually distinguishes between three main categories of PSS. The first category is product-oriented PSS, where the supplier focuses on product sales, and the role of services is to maintain and support the product business, such as product installation and repair (Kowalkowski & Windahl, 2015). These services are typically standardized and transactional, and the revenue model is input-based (Ulag & Reinartz, 2011) thus these offerings would not be regarded as solutions according to prevalent views in marketing literature (e.g., Biggemann, Kowalkowski, Maley, & Brege, 2013; Nordin & Kowalkowski, 2010; Tuli et al., 2007). The second category is use-oriented PSS (Tukker, 2004), which focus on achieving availability of the

overall system and its products; for example, an engine manufacturer guaranteeing the availability of its engines in terms of number of operational hours over a certain period of time. These offerings have an output-based revenue model (Ulag & Reinartz, 2011), and require more customization and closer customer-supplier relationships. Finally, suppliers with profound knowledge of customers' needs and operations can offer solutions for managing/operating customer processes (Helander & Möller, 2007). Such result-oriented PSS (Tukker, 2004) are the most complex offerings and the customers often only pay for actual, achieved performance outcomes and value-in-use (Macdonald, Kleinaltenkamp, & Wilson, 2016); for example, a printer manufacturer offering customers a pay-per-print service and take all responsibility for supplying and maintaining the printers.

Developing and delivering services and solutions are more complex tasks than manufacturing products, although they may not (initially at least) be seen as such by company managers. Even base services may require manufacturers to deploy parts, people and equipment at multiple locations (potentially in multiple countries – Neto, Pereira, & Borchardt, 2015), which should support an entire product portfolio (Cohen, Agrawal, & Agrawal, 2006). Furthermore, based on case study research, Alghisi and Sacconi (2015) find that developing advanced services without the correct alignment of the internal aspects of the business (strategic orientation and the service portfolio) with the external aspects (the customer and other actors in the service network) is likely to prove highly challenging; therefore, it is not surprising that extending the range of service offerings creates new risks for the manufacturer. To scope these risks, Nordin, Kindström, Kowalkowski, and Rehme (2011) provide a conceptual framework with three kinds of risk (operational, strategic, and financial) and three strategies for the provision of added service (customization, bundling, and widening the range of offerings). Risks include such issues as knowledge transfer, intellectual property, ownership of data, and various forms of outcome guarantees. In the empirical domain, Benedettini, Swink, and Neely (2017) analyze secondary data of 74 bankrupt manufacturers and 199 non-bankrupt competitors and find that providing a wider range of services does not consistently increase a firm's chance of survival. Risks cover *resource shortages* – firms may not have sufficient resources to develop the full array of services; *less focus on product activities* – firms may detrimentally expand their service offerings at the expense of product investments; and *complexity in coordination* – firms may struggle to coordinate multiple service/product offerings (Benedettini et al.,

Table 3
Summary and priorities for service offering research.

Summary of existing literature 1: A diverse range of taxonomies have been used to classify manufacturers' service offerings, although commonalities exist between many of them, often linked to the SSP/SSC dichotomy. Terminology also often differs across research streams for similar concepts (e.g., PSS vs. solutions). Gap in knowledge: What is the prevalence of different service types? Research priority? No, since each manufacturer will need to develop its own balance of services based on its customers' needs, strategy and resources/capabilities.
Summary of existing literature 2: The performance of SSCs and solutions is often focused on outcomes, which can involve greater risk-taking for manufacturers and their customers. Gap in knowledge: What risks do manufacturers and their customers face in developing solutions and advanced services? Research priority? Yes, since the scope and magnitude of these risks has yet to be determined from both the supplier and customer perspectives (RP1).

2017). Overall, despite there being some recognition of inherent risks in the complex process of delivering advanced services and solutions (empirically: Josephson, Johnson, Mariadoss, & Cullen, 2016; conceptually: Valtakoski, 2017), existing literature provides little empirical evidence about the nature of the risks involved.

The summary of the literature, gaps in knowledge and research priorities (RPs) for this theme are presented in Table 3.

3.2. Strategy and structure

Enhancing the role of services appears to be a distinct and favorable strategic option for manufacturers to help achieve competitive advantage, with Baines and Lightfoot (2013) providing support for this proposition based on case studies of four manufacturers. However, Josephson et al.'s (2016) longitudinal data from 168 manufacturers highlight the greater uncertainty inherent in a service-based business model caused by factors such as potential loss of strategic focus, resource constraints, and internal conflict. A service strategy for manufacturers is more complex than simply considering what services are offered; service orientation also includes changes to corporate culture and human resource management (Homburg, Fassnacht, & Guenther, 2003). Thus, as Raddats and Kowalkowski (2014) found in a survey of manufacturers, linking service orientation with service offerings leads to ambiguity, with categories of service offerings frequently used as proxies for service strategies. This critique seems pertinent to Gebauer's (2008) earlier survey research, which identified a taxonomy with four service strategies, each corresponding to a specific set of services (e.g., 'After-sales service provider' offering after-sales services and 'Development partner' offering R&D services). However, while the category of service offering may well reflect the strategic intent of the firm, this is not always the case; base and advanced services co-exist in the majority of large manufacturers (Baines & Lightfoot, 2013).

Diverse service strategies have been proposed (see Gebauer, 2008; Raddats & Kowalkowski, 2014), which are contingent on both external and internal factors. For example, findings from Löfberg, Witell, and Gustafsson's (2010) case studies identified factors such as company size, customer demands, competitor activities, and product characteristics. Meanwhile, Dachs et al. (2014), in a large pan-European study using secondary data, found that a service strategy may be more appropriate for small (a niche strategy) and large (product differentiation) manufacturers, but less so for medium-sized manufacturers. Despite a number of criteria used to discuss manufacturers' service strategies, the literature is far from conclusive about which manufacturers a service strategy is most applicable for, with many papers that use case studies simply extolling the virtues of strategies that involve strongly growing services; for example: a paradigm shift to services, rather than incremental changes (Barnett, Parry, Saad, Newnes, & Goh, 2013); radical, over incremental, service business model innovation (Kindström & Kowalkowski, 2014; Witell & Löfberg, 2013). Despite these claims, a

consideration of the papers in this review appears to show that most empirical research to date has studied manufacturers undertaking incremental, rather than radical innovation, suggesting that the prevalence of paradigmatic shifts to services being successfully undertaken is limited. This is also reflected by some recent conceptual studies on service strategy, which identify that research is solely focused on organic growth (Luoto, Brax, & Kohtamäki, 2017; Valtakoski, 2017). Thus, despite evidence that mergers and acquisitions (M&As) play a key role for many companies in achieving growth (Cartwright & Schoenberg, 2006), in their introduction to IMM's special section on servitization, Kowalkowski, Gebauer, and Oliva (2017) note that this strategy has been largely ignored in the literature.

Service strategy evolution can be likened to a maturation process as services assume a greater role within manufacturers, with changes to their offerings, capabilities, and processes. Data from Liinamaa et al.'s (2016) single case study shows that this evolution involves a transition from product- to more service-focused strategies, with the implication that services aligned to customer processes can best help to achieve competitive advantage. This is despite most manufacturers' traditional capabilities and expertise (and hence competitive advantage) being focused on the products themselves rather than what customers do with the products. Earlier studies, such as Oliva and Kallenberg (2003) seminal case study research, tended to conceptualize service maturation as a unidirectional, incremental process by which the services offered gradually change from base to more advanced offerings along one or more dimensions. However, more recent research has questioned this assumption; for example, Martinez, Neely, Velu, Leinster-Evans, and Bisessar (2017) identified a more complex service journey for manufacturers after conducting three longitudinal case studies. Using a 'problematization' methodology, Kowalkowski, Windahl, Kindström and Gebauer (2015) found that manufacturers need to balance service expansion and standardization activities and manage the co-existence of different roles for services. Meanwhile, after collecting data from single case studies, Peillon, Pellegrin, and Burlat (2015) proposed that servitization is integration between product and service activities rather than transition from products to services, and Forkmann, Ramos, Henneberg & Naudé (2017) found that service defusion is an essential counterpart to service infusion. Some conceptual papers also support plurality in service transitions. For example, Cusumano et al. (2015) challenge the view that companies move to the provision of advanced services that replace the purchase of a product only once the industry is mature. Araujo and Spring (2006) also note that opportunities for new services arise not only as a response to industry maturity or product commoditization but also from product innovations that create a gap between the capabilities of the producer and the user.

After conducting three case studies in the aerospace sector, Johnstone, Dainty, and Wilkinson (2008) concluded that adopting an appropriate service strategy is a complex process, taking place discontinuously, in incremental steps, without a clearly directed effort, but which is often driven by diverse customer requirements. Matthyssens and Vandenbempt (2010) also carried out multiple case studies and recommended that manufacturers should balance providing complex customized services with more repeatable, standardized service offerings. It is also the case that manufacturers' propensity to offer services dictates the actual services offered, with 'Service Enthusiasts' offering a wide range of services, while 'Service Doubters' offer very few (chargeable) services (Raddats & Kowalkowski, 2014). Indeed, there has been little research on the rationale or prevalence of Service Doubters, although Lay, Copani, Jäger, and Biege's (2010) evaluation of the data from the 2006 European Manufacturing Survey suggests there are many of them.

Using multiple case studies of SMEs, Kowalkowski, Witell, and Gustafsson (2013) stress the important roles of customers and other actors for servitization within the manufacturer's wider network (e.g., suppliers, distributors). In particular, through conducting a dyadic study of a manufacturer and one of its customers, Bastl, Johnson,

Lightfoot, and Evans (2012) found that manufacturers need to align their servitization strategies to customer requirements. There is, therefore, an interdependent relationship between a manufacturer's service strategy and the role of customers. Helander and Möller (2007) also conducted case studies to investigate supplier/customer relationships and found that manufacturers can only extend their services if this fits with customers' desired roles. Equally, through a case study of an aircraft manufacturer, Ferreira, Proença, Spencer, and Cova (2013) found that manufacturers need an interactive business model, taking account of relationships with a range of actors within the network (not just customers). This network perspective is also supported by data from Story, Raddats, Burton, Zolkiewski, and Baines's (2017) multi-actor case studies, with the need for manufacturers to develop compatible service strategies (and aligned resources/capabilities) with those of other actors. Despite the findings from these papers, a network view of service strategy has received relatively little attention in the literature to date.

Decisions about strategy are closely linked to those about organizational design (structure), with manufacturers needing to determine whether to integrate or separate product and service strategic business units (SBUs). Raddats and Burton's (2011) case study investigation of multiple industrial sectors found that the integrate/separate decision is dependent on the strategy being followed, with a particular strategy-structure configuration needed for each approach. There is a debate in the literature about which is the most effective configuration; with Neu and Brown's (2005) research, based on four case studies in the IT sector, suggesting that integration enables closer cooperation between product and service business units. However, separation is the prevalent view, as confirmed by the survey carried out by Oliva et al. (2012). Separation allows development of services which are not subservient to products, offering greater accountability for their performance and increased service orientation of corporate culture. However, as Auguste, Harmon, and Pandit (2006) conceptually found, separation may not be the optimal organizational design for manufacturers whose services are either immature or designed to 'defend' existing products businesses. Evidence from Davies et al.'s (2007) and Gebauer and Kowalkowski's (2012) case studies also show that for highly servitized businesses, customer-facing units bringing together products and services to offer repeatable customer solutions are the most appropriate structures.

The summary of the literature, gaps in knowledge and RPs for this theme are presented in Table 4.

Table 4
Summary and priorities for strategy and structure research.

Summary of existing literature 1: Manufacturers' unidirectional transition to services along a continuum has been questioned, with multiple trajectories proposed, based on balancing different roles for services and an enduring role for products. Gap in knowledge: What is the service maturation process for all actors (not just the manufacturer)? Research priority? Yes, by addressing the issue at a network or industry level, so the ramifications of the transition can be better understood (RP2).
Summary of existing literature 2: Research has almost exclusively focused on manufacturers undertaking organic growth to develop their services incrementally. Gap in knowledge: The potential for paradigmatic shifts to services for manufacturers, potentially through M&As, has received little attention. Research priority? Yes, as manufacturers seek to develop more radical approaches to service development it is possible that growth through M&As will become more important (RP3)
Summary of existing literature 3: Manufacturers seeking service growth often have dedicated service SBUs, although this may not be the optimal structure when services are immature or highly developed. Gap in knowledge: What is the optimal organizational design for manufacturers following different service trajectories? Research priority? No, it is clear that manufacturers need to adjust their organization design to reflect strategy and this may change as services become more mature.

3.3. Motivations and performance

Manufacturers' motivations to introduce services to their portfolio of offerings have generally been driven by a desire for improved financial performance, either through their products or the services themselves. Motivations for services have usually been assigned to one of three categories: competitive, economic and demand-based motivations (Oliva & Kallenberg, 2003). For competitive motivations, services are an important approach to help product differentiation (Dachs et al., 2014); thus, the performance of products is key, with services 'given away' if necessary (Witell & Löfgren, 2013). Economic motivations focus on service performance, namely revenue growth and stability and profitability. For example, Wise and Baumgartner (1999) conceptually found that services can yield an attractive share of revenue and the services market is often considered as being greater in magnitude than the actual product market. In addition, the average product margin in manufacturing industries is reported to be lower than the service margin (Oliva & Kallenberg, 2003). Malleret's (2006) case study research also found that revenue from services not only offers more attractive margins, but also a more stable source of income, either counter-cyclical or more resistant to the economic cycles that influence product investment. In a conceptual study, Potts (1988) noted that profitability differs greatly between different types of services. This was confirmed by Suarez, Cusumano, and Kahl (2013), whose empirical investigation of the software industry found that service profitability depends on factors such as share of service sales in the firm's total. In terms of demand-based motivations, results from Gebauer, Gustafsson, and Witell's (2011) survey-based study show that service differentiation can help manufacturers address more complex customer needs, which in turn can improve both product and service performance.

While these motivations are generally portrayed in the literature as homogeneous across all manufacturers, Turunen and Finne's (2014) conceptual study indicated that variations may exist based on such factors as the organizational environment in an industry, which may facilitate service-based competition. These findings were confirmed by subsequent empirical studies, with some products (e.g., Complex Products and Systems or CoPS) leading to greater service opportunities (Dachs et al., 2014; Lay et al., 2010; Raddats, Baines, Burton, Story, & Zolkiewski, 2016). It might be the case that other factors will discriminate manufacturers' motivations for services (e.g., geographic location), but their influence remains under-explored in the literature.

To determine manufacturers' service performance, quantitative empirical studies have suggested a range of measures; for example, revenue (Antioco et al., 2008), firm value (Fang, Palmatier, & Steenkamp, 2008) and most commonly profitability (Eggert, Thiesbrummel, & Deutscher, 2015). Equally, the market performance of services might be understood by considering the proportion of customers who purchase them (service adoption) and the range of service elements or the comprehensiveness of the service contract that customers opt for (service coverage) (Visnjic Kastalli & Van Looy, 2013). Complexity when measuring manufacturers' service performance means that single measures often provide an incomplete picture (Eggert et al., 2014). For example, manufacturers can increase revenue by adding services, but not necessarily improve profitability (Eggert, Hogreve, Ulaga, & Muenkhoff, 2011; Suarez et al., 2013). In the case of solutions, recent research reveals a complex picture: solutions are more profitable than other service offerings, but this positive effect is contingent on such factors as the sales capabilities of the supplier and the strength of the buyer (Worm, Bharadwaj, Ulaga, & Reinartz, 2017).

In other quantitative studies, Benedettini, Neely, and Swink (2015) found that manufacturers' service performance may be weak during the early stages of servitization as new resources, capabilities, and major structural changes to the organization are required. Few product-focused firms are able to easily and quickly cope with these challenges, for example, manufacturers may lack sufficient knowledge of customers' processes to be able to develop valuable offerings or

underestimate the difficulties in adapting these offerings to particular circumstances. Meanwhile, manufacturers who invest in services over time can compensate for these challenges and improve financial performance (Eggert et al., 2014; Visnjic, Wiengarten, & Neely, 2016). However, to have a positive impact on firm performance, services revenue may need to reach a critical mass within total revenue (Kohtamäki, Partanen, Parida, & Wincen, 2013); with a suggestion that this level equals 20–30% (Fang et al., 2008). After evaluating secondary data on 477 manufacturers during 1990–2005, Fang et al. (2008) found that the impact of servitization on firm value remains relatively flat or slightly negative until the firm reaches the critical mass. After that point, however, the service ratio provides an accelerating positive effect. Lay et al. (2010) find that among almost 2000 firms participating in the 2006 European Manufacturing Survey, on average 16% of their revenue came from services (Lay et al., 2010), so additional efforts are required to reach this critical mass. Fundamentally, the perceived lack of profitability presented in academic literature can be challenged. Earlier work in practitioner-based journals identifies selling SSPs such as installation, repair and (although not strictly services) spare parts as an approach to increased profitability without a critical mass caveat (e.g., Knecht, Leszinski, & Weber, 1993; Potts, 1988). It may, therefore, be questioned whether achieving a critical mass is really something manufacturers should be striving for unless they are developing SSCs.

Recent quantitative research suggests that services can have a positive impact on firm performance, whether the starting point for a service transition is a healthy or deteriorating financial position (Böhm, Eggert, & Thiesbrummel, 2017). However, this positive impact is dependent on both firm and industry factors, such as manufacturers developing services closely linked to their own products (Fang et al., 2008; Josephson et al., 2016; Visnjic Kastalli & Van Looy, 2013), since, as Raddats and Easingwood (2010) found after conducting multiple cases studies, there is little evidence that they will be successful through offering ‘vendor-agnostic’ services. It is less clear whether manufacturers should develop SSPs, SSCs or both to improve profitability. Manufacturers can maximize their services’ performance by laying a foundation with SSPs to gain insight into running a services business, and then use this foundation to develop a portfolio of SSCs, which address a wide range of customer needs (Eggert et al., 2014). Conversely, Antioco et al. (2008) urge manufacturers to develop SSCs to leverage product sales and then SSPs to increase service volume. For manufacturers experiencing low product innovation, both SSPs and SSCs can help improve firm profitability, while for those with high product innovation only SSPs improve profitability, with SSCs having to compete with products for investment (Eggert et al., 2011; Visnjic et al., 2016). Thus, the literature is rather ambiguous about the internal and external factors that might determine the most appropriate service implementation paths, despite a number of prior empirical studies.

The summary of the literature, gaps in knowledge and RPs for this theme are presented in Table 5.

3.4. Resources and capabilities

Research on this theme has generally used a resource-based perspective, as identified in Eloranta and Turunen’s (2015) literature review. In the context of manufacturers developing services, important resources might include: committed senior managers (Alghisi & Saccani, 2015, after conducting five case studies); the development of key performance indicators to assess customer value and financial resources (Barquet, De Oliveira, Amigo, Cunha, & Rozenfeld, 2013, via a single case study); digital technologies (Baines & Lightfoot, 2013); ‘people’, the ability to train and motivate them and their ability to act as a conduit for customer information (Santamaría, Nieto, & Miles, 2012 using a large-scale survey); a critical mass/economies of scale in service deployment (Visnjic Kastalli & Van Looy, 2013, via analysis of performance data collected from 44 subsidiaries of a single global manufacturer). Such studies, focusing on the importance of resources as a

Table 5

Summary and priorities for motivations and performance research.

Summary of existing literature 1: Research continues to substantiate previously discussed generic competitive, economic and demand-based motivations. Gap in knowledge: What other factors motivate manufacturers to enhance the role of services? For example, geographic location, product type, customer type. Research priority? No, since generic motivations provide sufficient explanatory power for most manufacturers.
Summary of existing literature 2: Services may not be profitable for manufacturers unless a critical mass is reached, although a critical mass appears unnecessary for SSPs. Gap in knowledge: Is a critical mass of SSCs required to achieve profitability? Research priority? Yes, the scale and scope of a manufacturer’s SSCs that are needed to achieve a critical mass require further investigation, since it is these services that are often unprofitable (RP4).
Summary of existing literature 3: There is a lack of clarity about the implementation path to improved service performance when considering whether to develop SSPs and/or SSCs. Gap in knowledge: Should manufacturers develop SSPs and/or SSCs and if both, which implementation path leads to the best outcome (SSPs, then SSCs or vice versa)? Research priority? Yes, this will help our understanding of profitable implementation paths for services (RP5).

concept owned and controlled by focal manufacturers, tend to adopt a manufacturer-centric view.

Other studies focus on capabilities, derived from the configuration and deployment of resources, rather than resources alone (Ulaga & Reinartz, 2011). Most of this research also takes a manufacturer-centric view, focusing on multiple capabilities internal to the firm. For example, Storbacka’s (2011) ‘solution business model framework’, developed by abductive methods, highlights the need for internal resource coordination. Using a dataset of Swedish manufacturers, Rönnerberg Sjödin, Parida, and Kohtamäki (2016) identified capabilities for culture change and an ability to innovate. Capabilities in IT management and ‘big data’ exploitation have also been recognized both empirically (Ceci & Masini, 2011) and conceptually (Opresnik & Taisch, 2015). Equally, Salonen and Jaakkola’s (2015) case studies identified the need to create modularity in services and solutions.

Using a qualitative approach, Matthyssens and Vandenbempt (2008) found that firms may not be able to generate all the necessary capabilities internally and that they need relationships with other actors. Relationships have thus been identified as a key component of the process of adding services to the offering, and this has been set out conceptually (Brown & Musante, 2011) and empirically by Prior (2015), Saccani, Visintin, and Rapaccini (2014) and Tuli et al. (2007). Some scholars, for example, Baines and Lightfoot (2013), using case study analysis, suggest that relationship management is a key operational practice or characteristic. Others, however, suggest that relationships facilitate the creation and implementation of capabilities that enable manufacturers to develop services and deliver competitive advantage; for example, Eggert, Böhm, and Cramer (2017) via an analysis of stock market data, and Kindström (2010) through analysis of seven case studies. Indeed, case study research draws attention to the service capabilities that customers possess and how these align with those of the manufacturer (e.g., Forkmann, Ramos, & Naudé, 2017; Story et al., 2017).

Relationships are not just procedural tools to be implemented from a manufacturer’s perspective alone; for example, using mixed methods Karatzas, Johnson, and Bastl (2016) analyzed data from 38 service triads. Indeed, the notions of servitization, service transition, and service infusion rather perpetuate the problem, given that they are generally conceived as something that manufacturers do; a change that they implement internally, rather than a process of collaboration with other actors. Associated with this, there is a need to consider whether relationship management is a strategic manufacturer-driven activity or a multi-actor process to create improved value. This notion of the external nature of relationships extends to the conceptualization of

capabilities beyond the boundaries of the firm, as demonstrated by [Spring and Araujo's \(2013\)](#) longitudinal case study. Using qualitative methods, [Paola, Saccani, Perona, and Gebauer \(2013\)](#) found that important firm-level capabilities for service provision range from being internally-focused, to those that are explicitly externally-focused or 'mixed' (internal and external capabilities). Empirical case study research has thus found that mixed capabilities involve complex inter-organizational orchestration ([Eloranta & Turunen, 2016](#); [Salonen & Jaakkola, 2015](#); [Story et al., 2017](#)). However, research on capabilities is often developed from the perspective of the focal firm, meaning that a dyadic perspective considering whether firms have the capabilities to deliver and importantly receive services is often overlooked ([Kreye, 2017](#)). This may be because the resource-based view ([Barney, 1991](#)) and dynamic capabilities, which much of this work recognizes, are inherently firm-centric ([Eloranta & Turunen, 2015](#)).

A final stream of research draws on network actor theory, as shown in case study research by [Cova and Salle \(2008\)](#), [Jaakkola and Hakanen \(2013\)](#) and [Windahl and Lakemond \(2006\)](#). This research is about manufacturers developing networks to create capabilities that cannot be easily created alone (e.g., [Storbacka, Windahl, Nenonen, & Salonen's, 2013](#) longitudinal research with 52 multinationals over 11 years). This work recognizes the significance of developing partnerships with key actors in the value chain, as identified by [Barquet et al. \(2013\)](#) and [Ferreira et al. \(2013\)](#). It also stresses collaboration between manufacturers and their *suppliers* (e.g., [Karatzas, Johnson, & Bastl, 2017](#) in their single case study); *customers* (e.g., [Kohtamäki and Partanen's \(2016\)](#) survey); and *intermediaries* (e.g., [Finne & Holmström's, 2013](#) case studies). Co-creating value within actor networks involves firms combining capabilities, with the solution often being the creation of new capabilities developed between actors (e.g., case studies by [Gebauer, Paola, & Saccani, 2013](#) and [Kreye, Roehrich, & Lewis, 2015](#)). Despite some agreement in the literature about the need to combine manufacturers' capabilities with those of other actors, the complexities of doing this have only recently been recognized. The ability to exploit the supplier network is a bottleneck for many manufacturers, since they have to rely on other firms and, therefore, lose a degree of control, as identified by [Huikkola and Kohtamäki's \(2017\)](#) case studies within the Finnish machinery sector.

The summary of the literature, gaps in knowledge and RPs for this theme are presented in [Table 6](#).

3.5. Service development, sales, and delivery

Driving new value through services requires manufacturers to deploy operational processes that organize and leverage the appropriate capabilities. The discussion of service development processes in the literature is dominated by the 'services are different from goods' argument ([Baron, Warnaby, & Hunter-Jones, 2014](#)), leading to a tendency

by most authors to explore New Service Development (NSD) through its differences with New Product Development (NPD) or its aspects that yield unique process challenges. Such explorations have been mainly conducted through qualitative case studies, which are most frequently premised on the notion that NSD implies increased market orientation and customer engagement (i.e., consultation, feedback, co-design) compared to NPD. Some papers draw on this notion more explicitly, concerned with delineating the necessary determinants or antecedents ([Lightfoot & Gebauer, 2011](#)) for successful service innovation within manufacturers' service initiatives (in line with mainstream literature, the terms NSD and 'service innovation' are seen as interchangeable in this paper). For example, [Bettencourt and Brown \(2013\)](#) use conceptual thinking and case-based evidence to develop the argument that meaningful service innovation in product companies must begin with a deep appreciation and understanding of customer value. [Santamaría et al. \(2012\)](#) show that manufacturing firms that engage in collaboration with customers are more likely to achieve successful service innovations. Similarly, the survey-based work of [Schaarschmidt, Walsh, and Evanschitzky \(2017\)](#) found that customer interaction is beneficial to both product and service innovation in a hybrid offering context. [Ettlie and Rosenthal \(2012\)](#) focus on the role of innovation champions and find, across case studies in different industries that the presence of champions leads to better NSD performance.

Within another set of contributions, referring to the planning of service innovation, scholars argue that manufacturers should adopt a structured and formalized NSD approach, as they do for NPD. Along these lines, [Kindström and Kowalkowski \(2009\)](#) and [Spring and Araujo \(2013\)](#) use insights from explorative case studies to elaborate prospective NSD process models, while acknowledging fundamental differences between NSD and NPD models. However, [Gremyr et al. \(2014\)](#) report evidence from 17 machine industry firms which casts doubt on whether it is possible to consider just one process model for service innovation, with the appropriate NSD process depending on the service innovation mode (e.g., incremental or radical innovation).

In addition, a small set of articles dwell upon the difficulty of mastering the relationship between NSD and NPD. [Kindström, Kowalkowski, and Sandberg \(2013\)](#), in a qualitative study of eight manufacturers, report that product and service innovation often compete for limited resources within the same firm. [Eggert et al. \(2015\)](#) present quantitative evidence that manufacturers directing their innovation efforts to both products and services outperform other companies, whereas some earlier empirical findings ([Gebauer et al., 2011](#)) indicate that manufacturers should focus on either product or service innovation to improve firm performance. These studies suggest that the relationship between product/service innovation strategy and firm performance is likely to be multifaceted, but they are clearly insufficient to draw definitive conclusions. For services closely linked to products, an additional question is whether their development should be integrated into NPD. The literature seems to be unanimous about this choice: empirical evidence strongly indicates that addressing NSD during the initial phases of NPD helps manufacturers build meaningful, value-adding product-service offerings, but only if they can deal with the risk that the innovation process is dominated by existing product-based routines (e.g., [Gremyr et al., 2014](#); [Rönnerberg Sjödin et al., 2016](#); [Uлага & Reinartz, 2011](#)).

When discussing the historical evolution of industrial sales practices, [Sheth and Sharma \(2008\)](#) point to the shift from selling products to selling services and solutions as an increase in customer-oriented or 'consultative' selling. Similarly, [Anderson, Kumar, and Narus \(2007\)](#) define 'value-based selling' as an integral part of solutions. Empirical research conducted through focus groups and interviews by [Uлага and Loveland \(2014\)](#) finds that these new sales models require different roles of salespeople and new sales proficiencies in order to develop 'service-savvy' personnel. [Reinartz and Uлага \(2008\)](#) and [Uлага and Reinartz \(2011\)](#) also draw similar conclusions. However, the insights from these studies are limited to evidencing that the relationship- and

Table 6

Summary and priorities for resources and capabilities research.

Summary of existing literature 1: A focal-firm perspective on the resources and capabilities required by manufacturers is often taken, utilizing theories around the resource-based view and dynamic capabilities.
Gap in knowledge: How do network actors (both upstream and downstream of the manufacturer) collectively develop capabilities?
Research priority? Yes, a network perspective is likely to provide stronger insight into how all actors create, deliver (suppliers) and acquire (customers) services (RP6).
Summary of existing literature 2: A dyadic (or network) perspective on resources and capabilities required by manufacturers has started to be considered which could offer a better understanding of how to achieve improved value outcomes.
Gap in knowledge: What are the potential difficulties when working with other actors to leverage the service capabilities?
Research priority? Yes, more research is required on understanding how to best include the contribution of other actors to manufacturers' service offerings in terms of both roles and relationships (RP7).

value-based nature of service sales processes demand very specific skills and competencies of individual salespersons, which do not fit the competence profile of existing product salespeople unless only very simple (base) services are offered. Each study typically includes examples of one or more critical difference between selling products and services (e.g., Reinartz & Ulaga, 2008; Salonen, 2011; Steiner, Eggert, Ulaga, & Backhaus, 2014; Ulaga & Reinartz, 2011), yet the emerging insights appear fragmented and in need of consolidation. Even though some recent empirical works (e.g., Ulaga & Loveland, 2014) have set out to more fully delineate the salespersons' attributes necessary for mastering the sale of integrated product/service hybrid offerings, they do not cover the overall array of skills and competencies proposed by the various studies that make up our dataset. This, we believe, still leaves some ambiguity as to how to align a company's sales force with hybrid offering sales.

Furthermore, existing research is almost exclusively focused on the sales force level. With the exception of the exploratory, qualitative study of Kindström, Kowalkowski, and Alejandro (2015), little attempt has been made to address the changes that need to be made at the sales function level (i.e., changes regarding sales organization and management) if manufacturers are to successfully sell services. Hence, the servitization literature does not convey a thorough understanding of what the alignment of the sales process with a service business model actually demands. As Storbacka et al. (2013) explicitly, and Tuli et al. (2007) implicitly, acknowledge, sales and sales management practices need to change when product-based firms add services to their portfolios of offerings, and a shift in the literature would be desirable with respect to the primary unit of analysis, from the salesperson to the sales function level.

As for service delivery, several reviewed papers regard the interaction with the customers created during this process as pivotal for capturing new service ideas and stress the centrality of its role within NSD. Here, researchers draw on the conceptual notion that successful service innovation implies repeated cycles of interactive co-creation with customers to argue for a link between NSD and service delivery processes (see Artto, Valtakoski, & Kärki, 2015; Chae, 2012; Kindström et al., 2013). Some case study work further finds service delivery operations to be a key resource for service sales, as they create relational ties and deep customer knowledge (e.g., Ulaga & Reinartz, 2011).

In general, scholars agree that it is within service delivery that the inherent differences between products and services have the greatest impact on firms hitherto focused on products (Baines et al., 2009). Exploratory case studies identify several challenges that service delivery presents for traditionally product-based organizations that seek to servitize, including the long timespan of many services (Matthyssens & Vandenbempt, 2010), the intensity of the relational dimension (Tuli et al., 2007), and the difficulty of visualizing the value conveyed (Kindström & Kowalkowski, 2009). However, the organization of service delivery processes is not studied in detail. A small set of contributions, including Baines and Lightfoot (2013), Datta and Roy (2011) and Smith, Maull, and Ng (2014) examine operational practices for service delivery, but they use very specific case studies and different conceptual frameworks, and so their insights remain heterogeneous. In particular, the operational practices for outcome-based services, where planning and designing supplier/customer interactions are critical, require further investigation (Batista, Davis-Poynter, Ng, & Maull, 2017).

Finally, the literature is turning increasing attention to the use of technology for service delivery. At the most basic level, manufacturing firms can leverage digital monitoring of assets to improve their service delivery, leading to more effective and efficient provision of base and intermediate services (Baines & Lightfoot, 2013; Kindström & Kowalkowski, 2014; Neu & Brown, 2005; Penttinen & Palmer, 2007). Yet, digital tools for service delivery may also create new opportunities for manufacturers to increase their service offerings. Considering the case examples of major companies in the vanguard of service provision, Allmendinger and Lombreglia (2005) formulate that such opportunities

often parallel a move towards more advanced service offerings, increasingly proactive services, performance-based contracts, and pay-per-use agreements. In a related study, Penttinen and Palmer (2007) develop a theoretical framework for evaluating firms' positioning and movement between base and advanced services. The use of this framework across four companies provides evidence that increasing levels of technology are incorporated in service delivery processes as companies move to more advanced service offerings; as such, the most advanced services cannot be provided without significant technical support. Evidence from Coreynen, Matthyssens, and Van Bockhaven's (2017) SME case studies confirms such conclusions.

More research is needed to analyze how manufacturers can effectively leverage digital technologies to offer new, higher-value services, especially in terms of the impact and return on investment of big data (Opresnik & Taisch, 2015) and the Internet of Things (IoT) (Rymaszewska, Helo, & Gunasekaran, 2017). Case study research suggests that a platform approach may be appropriate to do this (Eloranta & Turunen, 2016), where information sits alongside products and services as key components of advanced service offerings (Cenamor, Sjödin Rönnerberg, & Parida, 2017). Equally, service offerings may in future be defined as non-digital, digital-enabled and digital services, depending on the extent of digitalization.

The summary of the literature, gaps in knowledge and RPs for this theme are presented in Table 7.

4. Conclusions

This review demonstrates a significant evolution in the literature, with increasing coverage in four main research streams. The large number of papers in marketing and service management journals is noteworthy, although these streams have received limited attention from previous multi-theme reviews, primarily focused on work within operations journals.

Table 7

Summary and priorities for service development, sales, and delivery research.

Summary of existing literature 1: Attention is focused on formalized models that can guide NSD processes, which take account of the interplay and resource trade-off between product and service innovation. Gap in knowledge: How should manufacturers manage NSD and NPD to maximize the potential of both? Research priority? Yes, manufacturers appear to use existing NPD processes for services, although there are fundamental differences between NPD and NSD (RP8).
Summary of existing literature 2: The distinctiveness of service sales processes (as compared to product sales) have been related to attributes of service-savvy salespeople. Gap in knowledge: Little attempt has been made to address the service sales challenge at the sales function level. Research priority? Yes, it is unclear what sales/sales management practices should be adopted and how the sales function should be organized in order to maximize sales of products and services (RP9).
Summary of existing literature 3: There are several challenges for manufacturers in developing service delivery processes. Gap in knowledge: These challenges have been relatively under-explored in the literature. Research priority? Yes, some manufacturers still appear to struggle to overcome these challenges and develop suitable processes for their services (RP10).
Summary of existing literature 4: Advanced services can be based on digital service delivery processes, and there is a search of insights into how the exploitation of digital technologies (big data and IoT) can uncover opportunities for new service offerings. Gap in knowledge: How might big data and the IoT create opportunities for the delivery of new service offerings? Research priority? Yes, new digital technologies could radically alter how many services are delivered. Research also needs to consider how these technologies might help firms develop new service offerings and indeed business models (RP11).

4.1. Theoretical contributions

The first contribution of the study is the thematic account of the literature and the identification of five themes to which all papers can be assigned. A comparable review by Lightfoot et al. (2013) also resulted in five themes: product-service differentiation, competitive strategy, customer value, customer relationships, and product-service configuration. These themes, however, are set out at a more conceptual level, so, for example, customer value and customer relationships are discussed within the context of service-dominant logic (Vargo & Lusch, 2004). Thus, Lightfoot et al. (2013) do not provide a comprehensive thematic account of the literature, particularly given the previously noted lack of focus on papers in marketing and service management journals. This review, however, stands as the most complete attempt to categorize the literature based on research streams and themes. It provides a framework for researchers to consider inter-dependencies between themes (e.g., aligning specific service offerings to particular service strategies, even though a service strategy may include multiple service offerings) and within themes (e.g., motivations and performance). The review enables an assessment of where new studies can make a contribution in this field, addressing gaps in current knowledge.

The second contribution is the identification of the research priorities (RPs). These reveal the importance of a multi-actor interaction and relational perspective (Möller & Rajala, 2007). Thus, new service offerings need to be designed to take account of risk from both the supplier and customer sides (RP1). Service maturation needs to be viewed from a multi-actor perspective, including the transitions for customers and intermediaries (RP2). Manufacturers seeking radical service growth may need to consider M&As as part of their strategy (RP3). How manufacturers ensure SSCs are profitable requires further attention, both in terms of the scale necessary to achieve a critical mass and the scope of the services offered (RP4). Implementation paths for services need to consider which types of services (SSPs, SSCs) are required by customers and when (i.e., the timings of moving from one type of offering to another) (RP5). Capabilities for servitization need to take account of those available from all actors, not just the manufacturer (RP6). However, understanding how to overcome the difficulties of including the contributions of other actors in service offerings also requires attention (RP7). Here, relationships between manufacturers and upstream suppliers play an increasingly vital role for future research (e.g., Story et al., 2017; Vendrell-Herrero, Bustinza, Parry, & Georgantzis, 2017). Equally, the roles of, and relationships with, new entrants such as data intermediaries, who collect, host and analyze operational data for the installed base of products, are likely to become increasingly important.

NPD processes need to be modified for services, and advanced services in particular, to take account of more customer-specific drivers (RP8). Among such customer-specific drivers, geographic location is increasingly important. Thus, there is a need to understand how servitization develops in global markets, taking into account contextual factors (Fliess & Lexutt, 2017; Hakanen, Helander, & Valkokari, 2017). Sales management practices need to be managed to be able to exploit new advanced services, with account managers skilled at understanding and interpreting customer needs (RP9). Service delivery is a challenging activity for some manufacturers whose processes are more product-focused; therefore understanding how to overcome these challenges is important (RP10). Digital technologies can enable manufacturers to deliver new service offerings, providing better integration with customer processes (Coreynen et al., 2017). Such 'digital servitization' (Sklyar, Kowalkowski, Tronvoll, & Sörhammar, 2019) might even go beyond new service offerings and encourage companies to progress towards a digital transformation of the manufacturer's business model (RP11). Indeed, the impact of digital technologies in shaping inter-company relationships as part of servitization remains largely unexplored (Kamp & Parry, 2017).

Prior literature reviews demonstrate an implicit evolution from a

manufacturer-centric to multi-actor perspective. Baines, Lightfoot, Benedettini, and Kay (2009) identified three research priorities that were essentially internally-focused: service design, organizational strategy, and organizational transformation. Lightfoot et al. (2013) identified customer value and customer relationships as important conceptual themes (two out of five), while Eloranta and Turunen (2015) recognized the relational view as being at an early stage. In terms of prior reviews, Baines et al. (2017) go furthest and set out a number of 'developing' themes with a relational component; for example, co-designing product/service offerings with customers; the development of customer-supplier relationships; capability development within a network. Extending this work, our study provides a detailed account of the specific areas where a multi-actor interaction and relational perspective will be central.

Future research needs to consider how service maturation affects the co-creation of value within an extended network of actors including upstream suppliers and intermediaries, with a particular focus on the manufacturer/customer dyad (Fliess & Lexutt, 2017; Kamp & Parry, 2017). There has been a growth in the literature which acknowledges the importance of external networks and the relational aspects of service provision and value creation (e.g., Friend & Malshe, 2016; Gebauer et al., 2013; Kuijken, Gemser, & Wijnberg, 2017). However, the fundamental nature of this change, including the development of a service culture (Kowalkowski, Gebauer, Kamp, & Parry, 2017), means that future research should always consider the impact of an investigated construct (e.g. solutions, business models, capabilities) on other actors. In the literature to date, terms such as 'servitization' or 'service infusion' have been predominantly interpreted in a manufacturer-centric manner, implying action *by* manufacturers (on resources) *towards* other actors, rather than *with* other actors. Future research, therefore, needs to encompass the interactive service maturation process for all network actors; that is, how two or more businesses reciprocally affect each other's service maturation.

4.2. Managerial implications

This study has important implications for managers. If servitization is only seen as a manufacturer-focused transition, then it might explain why some companies fail to achieve success with services, the so-called 'service paradox' (Gebauer, Fleisch, & Friedli, 2005). They find themselves unable to navigate the complex and heterogeneous needs of other network actors and thus fail to develop the necessary capabilities and solutions valued by customers. As a result, managers in focal manufacturers and other actors are urged to take account of each other's service maturation.

Each theme from this study creates the following implication for managers: for *service offerings*, managers should recognize that the diversity of the service business is potentially greater than the heterogeneity between the firm's product offerings, meaning that a single approach to managing the service portfolio may prove ineffective. Equally, in developing new service offerings (including solutions), manufacturers have to manage multiple risks (strategic, operational, financial) and appreciate that customers also face new risks in contracting with suppliers on this basis.

For *strategy and structure*, managers should determine what the optimal service trajectory is for their company, recognizing that multiple trajectories can occur in parallel and paying attention to the implications for other actors. It may be that a radical shift to services requires more formal relationships with other companies, through M&As. Equally, a separate services function is not necessarily the optimal organizational design, although it is one that can help 'kick start' a services culture in the organization. In many cases, while separation is vital for building a service culture and business, closer integration between product and service SBUs becomes important for the provision of solutions.

In terms of *motivations and performance*, service growth may be

possible when products are complex, competitors are already developing service business models and customers require suppliers to become more engaged in their operational processes. In addition, managers need to determine which services are most likely to be valued by their customers. While SSPs may be the initial choice, it may be SSCs that are most important to customers since they can help bring about more significant business process transformations.

For *resources and capabilities*, managers need to consider whether capabilities beyond their own organization (e.g., from intermediaries and customers) can be deployed as part of a services strategy. It is the capabilities from the interaction of all actors that determine whether a service strategy comes to fruition.

Finally, for *service development, sales, and delivery*, managers need to adapt (or make more fundamental changes to) the NPD process for services to take account of the ‘customer voice’. They also need to be aware that service and solutions salespeople require different skills sets from product salespeople, and should pay attention to the organization and management of the sales function. Managers should be prepared to exploit opportunities from new digital technologies that could enable the delivery of new service offerings and improve the fulfillment of existing ones. Digital technologies may also transform existing servitization business models; however, managers need to take care not to become too immersed in technical issues (i.e., a traditional product-centric approach) or ‘carried away’ by the hype that often surrounds new technology, at the expense of a fuller understanding of customers’ business needs and value creation.

4.3. Limitations

As would be expected, this paper has some limitations. Only journals from MOS were considered, and although this topic receives attention in other fields such as engineering management, it is often the

terminology rather than the key themes that differ in these journals (see the discussion on PSS in Section 3.1). That said, the arguments on the environmental aspects of manufacturers’ services found in some engineering management (and other) journals are noted (e.g., Agrawal & Bellos, 2017), although excluded from this review. Furthermore, this paper did not include journals ranked as 1* or below in the AJG, conference papers or books. Although other reviews have included these contributions, applying a rigorous quality threshold has helped to develop the paper’s contribution and distinguish it from other reviews.

Finally, the suggested priorities for future research on servitization were identified through the research team’s judgment about the importance of different research gaps within the literature. Therefore, it is possible that the research team’s interests and backgrounds may have predisposed their view on how they would like the field to evolve and, in turn, influenced the selection of some of the research priorities. However, while other researchers might disagree with the presented research priorities, our study shows that the study of servitization is far from being complete. Despite the sharp rise in publications in recent years, there are still many pertinent research themes within the domain of servitization that need to be addressed.

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Appendix A. Journals and research streams in the review

Research stream	No. papers 2005–2017	No. citations ^a
General management		
European Management Journal	7	1565
Journal of Business Research	5	1032
Harvard Business Review	3	828
MIT Sloan Management Review	2	688
McKinsey Quarterly	2	157
Management Science	1	131
Strategic Change	2	122
Strategic Management Journal	1	98
California Management Review	1	77
Journal of Managerial Psychology	1	66
Journal of Revenue and Pricing Management	1	65
Industrial and Corporate Change	1	65
Scandinavian Journal of Management	1	55
Business Horizons	1	33
Journal of Economics & Management Strategy	1	32
<i>Number of papers/citations</i>	<i>30</i>	<i>5014</i>
Marketing		
Industrial Marketing Management	56	6577
Journal of Marketing	4	2297
Journal of Business & Industrial Marketing	23	924
Journal of Business-to-Business Marketing	2	246
Journal of the Academy of Marketing Science	3	222
Journal of Product Innovation Management	2	203
Technovation	1	146
Research Technology Management	7	142
Industry & Innovation	1	57
Creativity and Innovation Management	1	24
<i>Number of papers/citations</i>	<i>100</i>	<i>10,838</i>
Operations		
International Journal of Operations & Production Management	19	2168
International Journal of Project Management	1	597
International Journal of Production Economics	19	475

Journal of Operations Management	1	319
Production Planning & Control	10	179
Supply Chain Management: An International Journal	1	61
International Journal of Physical Distribution & Logistics Management	1	43
Journal of Management Information Systems	1	21
Journal of Supply Chain Management	1	10
Business Process Management Journal	1	0
Number of papers/citations	55	3862
Service management		
Journal of Service Research	7	744
Journal of Service Management	21	857
The Service Industries Journal	6	282
Journal of Services Marketing	1	41
Number of papers/citations	35	1180

^a Citations from Google Scholar (June 2018).

Appendix B. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.indmarman.2019.03.015>.

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